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GROWTH ATTRIBUTES OF BARLEY (*HORDEUM VULGARE* L.) CULTIVARS IN RELATION TO SOWING TIME

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Abstract

Field experiment was carried out to study the effect of sowing times on growth attributes of two barley (*Hordeum vulgare* L.) cultivars. Results indicated that growth attributes like, RGR, NAR and RLGR of both the cultivars decreased when plants were sown after 17 November. But LAR increased at later sowings.

Barley (*Hordeum vulgare* L.) is a minor winter cereal crop in Bangladesh, where winter is very short and mild. Sowing of barley depends on date of harvest of the preceding crop and farmer's priorities for sowing, which results early or delayed exposure to winter environment. Early sowing encounters rich soil moisture resulting in seedling damage, fertilizer leaching and long vegetative period. On the contrary, late sown planted barley experiences low temperature at the vegetative phase and as a result various physiological processes decrease. Appropriate sowing time is necessary for ensuring better growth performances of barley.

Many works have been done on grain yield of barley in relation to sowing time (Farid *et al.* 1993 and Begum *et al.* 1999) but growth attributes of barley in relation to sowing time has not yet been studied in Bangladesh. The present experiment was carried out to find out the suitable sowing time for better growth performances of barley.

The experiment was conducted at the research field of the Department of Botany, University of Rajshahi, Bangladesh. The soil of the experimental field was silty loam with pH 6.6. The experiment was conducted in a split plot design with three replications. Two cultivars of barley (BB 1 and Karan 351) were sown in four sowing dates *viz.*, 5 November (S_1), 17 November (S_2), 29 November (S_3) and 11 December (S_4). Each plot, 8 m long and 6.5 m in breadth, consisted of 32 rows. Row to row distance was 20 cm, and plants in a row was 5 cm apart. Data from six randomly selected plants from middle rows of each plot were recorded at 10 days interval from 20 days after sowing (DAS) to maturity.

The curve fitting method (functional technique) was followed to determine growth attributes. In the curve fitting method, polynomial functions were fitted to normal logarithmic values of total dry weight and total leaf area using the spreadsheet analysis program Microsoft Excel version 7.0. The $\log_e$ transformation was made in order to render the variance homogeneous with time (Hughes and Freeman 1967). The selection of appropriate polynomial regression model was done by 'lack of fit' method of Nicholls and Calder (1973).

Relative growth rate: RGR of all the cultivars irrespective of sowing times declined with increasing plant age and plant dry weight having uncharacteristically negative values at the later stages of growth (Fig.1a). The reason for higher RGR values at the earlier stages of growth is possibly to have the juvenility of the plants and less effects on accumulation of dry matter and decrease at the later stages could be attributed to self-shading of lower leaves by upper leaves (Thorne 1961). In the present investigation, higher RGR was found in S_2 and cultivar BB1 had

higher RGR than Karan 351. Sowing effect was significant at 60 DAS and later growth stages but.

Fig. 1. Influence of different sowing times on: (a) relative growth rate, (b) net assimilation rate, (c) leaf area ratio and (d) relative leaf growth rate of two barley cultivars (BB 1 and Karan 351) at different stages of growth from quadratic curve fitted values.

non significant at the earlier growth stages, but cultivar effects were significant at every stages of growth. It was also observed that sowing time × cultivar interactions were significant at all the stages of growth.

Net assimilation rate: Net assimilation rate (NAR) increased slowly with fluctuations in most cases and reached its peak at 70-80 DAS and thereafter declined sharply at the later stages of growth (Fig.1b). In many cases it reached negative values at the later stages of growth. Similar result was reported by Yang *et al*. (1990) in barley. In the present investigation, the highest NAR values of both the cultivars were found in S_1 and the lowest in S_3. All the main factors were significant at all the growth stages. Significant sowing time × cultivar interaction was also found.

Leaf area ratio: LAR values of both the cultivars and sowings declined with increasing plant age (Fig.1c). It might be due to abscission of older leaves at the later growing stages. In the present investigation LAR was found higher for S_3. Sowing times and cultivars were significant at all the stages of growth. The interaction between sowing time × cultivar was also found to be significant at all the stages of growth.

Relative leaf growth rate: RLGR values were found to decrease with increasing plant age (Fig.1d). The cause of decline of RLGR at the later stages was due to abscission of older leaves. It was also observed that high temperature at the later stages of growth accelerated the abscission of older leaves. RLGR was higher for S_1 and lower in S_4. This was due to higher temperature at the later stages of growth. Moreover, scarcity of available soil water in that time also reduced leaf growth. RLGR values obtained from the curve fitted method drifted with plant age and also with increasing plant weight. Cultivars and sowing time × cultivar were also significant at every stages of growth.

The overall results of the present investigation indicated that growth attributes like RGR, NAR and RLGR were higher for early sowing. LAR was higher for late-sown (S_3) plants and lower for early-sown plants.

References

Begum, S., M.G. Moula., M.A. Rahman and D. Nessa. 1999. Effect of sowing time and seed rate on the yield of barley. Bangladesh J. Agril. Sci. **26**: 81-85.

Farid, S.M., A. Hossain and A.B.M. Salahuddin. 1993. Sowing date effects on the yield of three cultivars of barley. Bangladesh J. Agril. Sci. **20**: 41-45.

Hughes, A.P. and P.R. Freeman. 1967. Growth analysis using frequent small harvests. J. Appl. Ecol. **4**: 553-560.

Sarker, A.M. and N.K. Paul. 1998. Studies on growth attributes of wheat under irrigated and rainfed conditions. Bangladesh J. Bot. **27**(2): 119-126.

Thorne, G.N. 1961. Effects of age and environment on net assimilation rate of barley. Ann. Bot.. **25**: 29-38.

Yang, J.S., M.S Lee., J.G. Kim and H.J. Han. 1990. Studies on the nutritive value of forage barley. I. The comparative analysis of growth and dry matter accumulation pattern in barley and rye. Research Reports of the Rural Development Administration. Livestock. **32**: 42-48.

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